

REMARKS

Applicants have reviewed the comments, objections, and rejections set forth by the Examiner in the Office Action dated August 25, 2004 and respectfully respond with the amendments above and the following remarks. Claims 6-9, 14-16, and 18-30 are pending in the present case. Claims 6, 8-9, 14, 16, 18, and 20 are amended herein. Claims 1-5, 10-13, and 17 are cancelled herein. New Claims 21-30 follow amended Claim 20; no new matter is added. Applicants respectfully request reconsideration in view of the above amendments and the arguments set forth below.

ALLOWABLE SUBJECT MATTER

Applicants respectfully thank the Examiner for pointing out the allowable subject matter of Claims 6-8, 14-16, and 18-20. Amendments were made to claims herein, and new Claims 21-30 were added, to incorporate the indicated allowable subject matter, as discussed below. Applicants respectfully request the Examiner's review and allowance thereof.

OBJECTIONS

OBJECTIONS TO THE DRAWINGS

Applicants respectfully thank the Examiner for accepting the original drawings filed on January 14, 2004, for examination purposes. The drawings are objected to; new formal drawings were required upon claim allowance. Applicants respectfully submit herewith new formal drawings for the subject application. Applicants respectfully request the Examiner's review and approval thereof.

OBJECTIONS TO THE SPECIFICATION

The disclosure is objected to for informalities. The disclosure is amended herein to correct these informalities. As amended herein, Applicants respectfully assert that the specification is acceptable. Applicants respectfully request the Examiner's review and approval.

OBJECTIONS TO CLAIMS

Claims 6-8, 14-16, and 18-20 are objected to as dependent upon rejected base claims, but were said to be allowable if re-written in independent form including what is recited in the base claim and intervening claims. Claims 1-5, 10-13, and 17 are cancelled herein. Claims 6, 14, and 18 are amended herein to respectively incorporate the elements originally recited in Claims 1-5, 10-13, and 16, as discussed below. Thus, Applicants respectfully assert that the objections to Claims 6-8, 14-16, and 18-20 are moot. Applicants respectfully request the Examiner's review and allowance.

CLAIM REJECTIONS

35 USC 102

Claims 1-3, and 9-11 are rejected under 35 USC 102(a) over US Patent No. 5,514,892 to Countryman, et al. (hereinafter Countryman). Applicants have reviewed the reference cited and respectfully assert it does not teach or suggest the embodiments of the present invention as recited in Claims 6-9, 14-16, and 18-30 for the following rationale.

As Applicants understand the reference, Countryman teaches an electrostatic discharge protection apparatus for use below a wirebond pad. Countryman, col. 1,

II. 5-9; col. 2, II. 4-10; col. 5, II. 24-25. The teaching of Countryman differs from the embodiments of the present invention recited in Claims 6-9, 14-16, and 18-30.

As amended herein, Claim 6 reads as follows, with underlining added for emphasis:

6. A semiconductor structure comprising:
a pad area;
an electrostatic discharge protective device disposed below said pad area, said electrostatic discharge protective device comprising a transistor and a resistance, wherein said pad area comprises:
a substrate;
a first layer of metal disposed above said substrate wherein said electrostatic discharge protective device is disposed below said first layer of metal; and
a second layer of metal disposed above said first layer of metal;
a layer of dielectric disposed between said first metal layer and said second metal layer; and
a via disposed within said dielectric layer wherein said via electrically couples said first and said second metal layer, wherein said via comprises a plurality of individual vias and wherein said resistance comprises a portion of said plurality of individual vias, wherein said individual vias comprising said portion are arranged electrically in parallel one to another.

Claims 14 and 18 are amended herein in a similar way, and new Claim 27, which recites related subject matter, is presented herein. Claims 27, and Claims 14 and 18, as amended herein, recite that a semiconductor structure has an electrostatic discharge protective device (hereinafter ESPD) disposed below a pad area thereof, which has a resistance. The semiconductor structure also has a via, comprising a plurality of individual vias arranged in parallel, which comprise a portion of the resistance of the ESPD.

Forming a semiconductor structure with an ESDP, including its resistive components, such as a resistance, below its pad area has advantages related to

efficient use of the available semiconductor material, device and circuit layout, and concomitant economic savings. Further, using individual vias of a plurality of vias as a component of the ESDP resistance has the advantage of allowing the resistive value of the ESPD resistance to readily be fixed during a process for fabricating the semiconductor structure, with concomitant benefits related to economics and efficiency of fabrication.

For instance, the resistive value of the ESPD resistance can readily be fixed with (a) setting a particular number for the portion of the plurality of individual vias in parallel; (b) forming the individual vias comprising the portion of the plurality of individual vias with a particular cross sectional area; and (c) forming the individual vias comprising the portion of the plurality of individual vias with a particular length. These advantageous techniques are respectively recited in dependent Claims 8, 25, and 26, Claims 16, 23, and 24, Claims 20, 21, and 22, and Claims 28-30.

Applicants have reviewed the Countryman reference and find no teaching therein directed towards a semiconductor structure that has a via, comprising a plurality of individual vias arranged in parallel, which comprise a portion of the resistance of an ESPD disposed below a pad area thereof. Applicants respectfully agree with the Examiner that this is not taught by the Countryman reference.

In fact, Countryman expressly teaches that the resistance of the ESDP device therein is "N-type [i.e., semiconductor material] ohmic [sic] contacts ... [elements] 33-38 [Fig. 3 therein] are formed in N-wells [i.e., semiconductor material] [elements] 25 through 30, respectively." Id. at col. 2, l. 67-col. 3 l. 4. Applicants respectfully assert that, in teaching that the ESDP device resistance is comprised of Ohmic semiconductor contacts, Countryman expressly teaches away from the

embodiments recited in Claims 6-9, 14-16, and 18-30, which recite that a plurality of individual vias arranged in parallel comprise a portion of the resistance of the ESPD.

Countryman further expressly teaches that "Ohmic contacts 33-38 ... are manufactured by the conventional ion implantation of arsenic and boron, respectively, into P-substrate ... followed by an annealing step." Id. at col. 3, ll. 5-9. Applicants respectfully assert that, in teaching that the Ohmic components of its ESPD are so formed, Countryman expressly teaches away from the embodiments recited in Claims 6-9, 14-16, and 18-30, which recite that a plurality of individual vias arranged in parallel comprise a portion of the resistance of the ESPD, because such conductive vias are not so formed. Thus, Applicants respectfully assert that Countryman does not teach or suggest the embodiments of the present invention recited in Claims 6-9, 14-16, and 18-30.

35 USC 103

Claims 4-5, 12-13, and 17 are rejected under 35 USC 103(a) over Countryman in view of the Background section of the above captioned application. Claims 4-5, 12-13, and 17 are cancelled herein. Thus, Applicants respectfully assert that their rejection under 35 USC 103(a) is moot.

CONCLUSION

Applicants respectfully assert that, as amended herein, the drawings, specification, and claims are not objectionable.

By the rationale stated above, Applicants respectfully assert that Claims 6-9, 14-16, and 18-20 are allowable over the cited reference and thus comport with 35 USC 102(b) and that the rejection of Claims 4-5, 12-13, and 17 under 35 USC 103(a) is moot. Applicants also respectfully assert that new Claims 21-30, incorporating allowable subject matter, comport with 35 USC 102(b) and 35 USC 103(a). Applicants respectfully assert therefore that Claims 6-9, 14-16, and 18-30 are in condition for allowance.

Accordingly, Applicants respectfully request that the rejection of Claims 1-3, and 9-11 under 35 U.S.C. 102(b) be withdrawn and that Claims 6-9, 14-16, and 18-30 be allowed.

Please charge our deposit account No. 23-0085, for any unpaid fees.

Respectfully submitted,
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